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EXPLOSIONS OF BOILERS—RENEWED DISCUSSIONS OF THEORIES.

No subject has been more frequently discussed than "the cause of steam boiler explosions." It is one of those questions which in its very nature demands frequent attention. New circumstances and repeated calamities call for further investigation and discussion. The subject has lately been before the Academy of Sciences in Paris; and communications upon it have appeared in the *London Engineer*, *Mechanics' Magazine*, and one in the *New York Daily Times*. Various and contrary theories have been presented. All cannot be right, but each should be carefully examined and candidly judged. The author of the article in the *New York Times* calls attention to "the momentous issues which hang" upon the boilers of the three hundred steamers now employed by the Government, and says:—

Quite recently, while experimenting for a very different purpose, Mr. Edwin Stevens, of Hoboken, developed the great fact that water cannot exist as water, under the atmospheric pressure, at a higher temperature than 212°. Now, the temperature of the water in a boiler under steam pressure of 100 lbs. is 330°. If, then, the steam, pressing on this water, can instantly escape, as through a rupture caused by mere weakness of the metal or by overpressure, a great part of this water at 330° will instantly flash into steam, carrying the rest with it at about the velocity of a cannon ball. So far we know. The theory is, that this flying body of inelastic water particles operates like so many projectiles—like a broadside of grape—tearing into pieces everything within reach. Thus explosions start in simple ruptures, and ruptures always result from carelessness.

It is generally admitted that an explosion is caused by a pressure of steam greater than the metal of the boiler can withstand. Some explosions have probably occurred by overpressure gradually accumulated, but many have undoubtedly been caused by overpressure from a great quantity of steam suddenly generated, its mechanical action being similar to the ignition of gunpowder in a confined space. A variety of opinions exist with regard to the cause of the rapid generation of steam in many cases. The rupture theory, presented in the above extract, is liable to the charge of being illogical. As an explosion cannot take place in a boiler after a rupture, unless the pressure is subsequently greatly elevated, it is apparent to reason, that all the steam generated by the surplus heat in the water, must be of a reduced pressure to that which produced the rupture. The molecules of water are so mobile that they cannot produce an effect like grape shot. The scientific world will certainly be astonished to be informed at the present day, that Mr. Stevens developed the fact that water heated above 212° cannot exist as water under atmospheric pressure. It is one of the most widely known facts of science.

Another cause of the rapid generation of an overpressure of steam, is the use of water deprived of atmospheric air in the boiler. In 1847, Professor Donny, of Ghent, in making some experiments, discovered that water deprived entirely of atmospheric air could be heated to 275° Fah., without boiling, but when elevated a few degrees above this point, it flashes into steam with the rapidity of a gunpowder explosion. Boilers kept under fire for some time, with deranged feed pumps, are deprived of atmospheric air, and they thus, according to Professor Donny's discovery, become as dangerous as gunpowder magazines in the vicinity of a conflagration. Many very violent boiler explosions of an apparently

mysterious character may be explained by this theory, which has lately been discussed in the Paris Academy of Sciences. The use of Giffard's injectors, in place of feed pumps, whereby a constant supply of water containing air is furnished to boilers, when standing still as well as when the engine is running, should prevent explosions from this cause.

Various other theories respecting the causes of steam boiler explosions have been presented to the public. We cannot now occupy space for their reproduction. Our subject, at present, principally is to direct the attention of scientific and practical men to the subject for more careful and profound investigation. Many explosions have lately taken place, both at home and abroad, and an apparent mystery seems still to hang over some of them. We are positive, however, that most of the boiler explosions which have taken place, can be traced to ignorance or carelessness on the part of those who were entrusted with their management. All such catastrophes may be prevented by care, proper attention and intelligence, admitting either of the theories presented to be correct. Since no less than 300 steamers are now employed by our Government, and under very exciting circumstances, unceasing vigilance over the boilers should be exercised by all our naval engineers. Thus far they have given a good account of themselves.

INDIAN CORN FOR ENGLAND.

A correspondent of *The Prairie Farmer* in England, pays a glowing tribute to indian corn, and states that England to-day wants cheap bread for her people more than all other things, and America can give her this. The people of England are feeling the calamities of this war more than those of our northern States, because hundreds of thousands of them are deprived of employment on account of the stoppage of the cotton factories. Indian corn, he believes, can supply them with cheap bread, and Illinois alone can furnish almost all that is necessary. Little is known in Great Britain, however, respecting indian corn. It is chiefly regarded as food for animals, and as being totally unfit for human use. This is not surprising, as most of that which arrives at British ports is musty, and this is the point to which we wish to direct the attention of grain shippers. It is asserted by this correspondent that all the corn which he has seen in Europe is no better than that which is rejected by inspectors at Chicago. That which is designed for transportation should be kiln dried, and when designed for bread in England, it should be bolted like wheat when it is ground. On our lake boats, canal boats and ocean vessels which carry grain, too little care is bestowed upon it, to keep it dry and well aired. Corn when shipped in bulk is very liable to heat and become musty, especially when kept in the holds of vessels, where the atmosphere is always damp, and where no provision is made for ventilation. To carry grain properly on water, it should either be kept in perfectly air-tight bins, or it should be frequently turned over and currents of fresh air driven through it. Millions of bushels of wheat and corn are ruined annually by the carelessness of those who carry them and the inefficient means which they employ for securing such grain from injury.

OUR IRON-CLAD FLEET.

The number of iron-plated vessels, including those finished and those in process of construction for the United States Government is stated at the present time to amount to 49. Of these 21 are for the Western waters and 27 for the Eastern coast. These have all been described in our pages with the exception of the first of the Western gunboats, and a good idea may be had of these from the description and illustration of the ram, *Arkansas*, in our present number.

FILLING OF THE GREAT RESERVOIR.

The water was let into the new reservoir located in Central Park, this city, on the 19th inst. It is one of the greatest artificial water basins in the world. The entire space inclosed is 106½ acres, and 96 are covered with water. It is 30 feet deep and can hold one billion of gallons. The reservoir is divided into two great compartments by a bank 33 feet in height, 117 wide at the bottom and 15 feet at the top. Its

form is irregular, which is due in a great measure to the nature of the ground. A vast amount of rock blasting was necessary to obtain the requisite depth. It has three gate houses, the banks on the inside are faced with cement, on the outside they are covered with grass. This reservoir will afford a large stated supply of water to the city, if one or several of the main distributing pipes should accidentally be injured. It is over three years since its construction was commenced, and it cost \$1,500,000. It is a beautiful artificial lake and adds greatly to the attractions of the Central Park, while it furnishes the city with "its crystal drafts of heaven distilled beverage."

THE POST OFFICE—ITS RISE AND PROGRESS

The Post Office has formed an important department in every civilized country since the days of Cyrus, the Persian, who is accredited with the origin of regular postal arrangements between different parts of his empire. His couriers, however, only carried government dispatches, still this was the initiation of the system. The Germans claim that a regular postal system for carrying the letters of citizens was first adopted in the Republic of the Hanse Towns in the thirteenth century, and from thence it extended to other parts of Europe. No well defined system existed in England up to the reign of Charles I., who, by royal proclamation, established post offices in various cities and towns in England and Scotland, and transmitted the mails regularly between them. In those days the mail bags were carried on horseback and on foot, as traveling by carriages was unknown, and macademized roads had not been invented. No provision, however, was made for the transmission of letters inside of cities until about 1663, when an upholsterer in London, named Robert Murray, set up a penny post and express, and delivered letters and parcels several times every day in various parts of that city. This enterprise was very beneficial to the merchants and people, and it promised to be lucrative to its author; but the Duke of York (afterward James II.) claimed that it was an infringement of a post office monopoly granted to him by his brother the king, and so the profits of the first London penny post went to swell the revenues of the selfish duke.

In 1692, a postal system was projected for the American colonies, but it was not organized until 1710. In 1753, Benjamin Franklin was appointed Postmaster General for the colonies, and his practical mind soon devised superior modes of managing the details and improving the revenues. In 1789, the adoption of the Constitution conferred the power upon Congress of managing the post office. In 1790, there were only 75 post offices in the United States, and the total revenue was but \$37,985. The rates of postage from the new organization of the department until 1816, were for a letter written on a single sheet of paper 8 cents, carried a distance under 40 miles; over this and under 90 miles 10 cents; over this and under 150 miles 12½ cents; over this and under 500 miles 25 cents. These rates were modified, but not reduced in 1816, and so continued for many years afterward although they were felt to be very high. In 1836, the Hon. Edward Everett brought up the subject of reducing the postal rates in Congress; but no well digested plan was offered for adoption. About this period nearly the same rates of postage prevailed in Great Britain, but a new Parliament elected under the Reform Bill had come into power, and one member of it—Mr. Wallace, of Kelly—had resolved to devote his energies to reforming the post office, and he was ultimately successful. No proper occasion was neglected by him in introducing the subject, and he succeeded in obtaining the appointment of a committee to investigate the whole system and report to Parliament. An original and practical man in the person of Mr. Rowland Hill, a secretary in one of the Government offices, had his mind directed to the subject, and by a thorough examination of the income and expenditures and the modes of conducting the post offices and carrying the mails, he came to the conclusion that a universal penny post system for the United Kingdom would be successful. He, therefore, made his plans and proposed the new system for adoption. At this period—1837—there were but 76 millions of letters carried annually by the British Post Office, and to pay all expenses by the new system it required 380,000,000 letters to be carried. Mr. Hill calculated that the reduced rates of postage